Research Summary

Wetting behaviors of liquid on rough surfaces is critically important to many applications such as the coatings for marine vessels. In our wetting research, we have systematically studied the wetting process of a water droplet interacting with a series of micropatterned hybrid surfaces at different initial conditions. The hybrid surface of the micro-pillar is made with an SiO2-based top-surface (which is highly hydrophilic) and Teflon-based side and bottom surfaces (hydrophobic). We have developed a set of experimentally validated continuum simulation tools as well as novel theoretical models. Using our numerical simulations and theoretical models, our research has achieved important concluding remarks in wetting phenomena:

* The wetting state transitions, which are the Cassie-to-Wenzel and Wenzel-to-Cassie transitions, are critically important to affect the wetting behaviors of coated rough surfaces.
* 2. The dynamic wetting behaviors are more important than the static wetting states in the wetting analysis to evaluate the coated surfaces.

Here is a video related to the research:

